

## PATENT ABSTRACTS OF JAPAN

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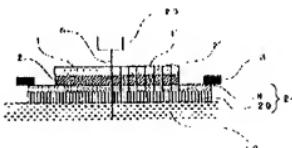
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## (54) METHOD FOR DICING SEMICONDUCTOR WAFER

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a means for preventing cracks from generating in a step of dicing a semiconductor wafer, and further easily integrally bonding a small piece of a die bond sheet having the same dimension as a semiconductor chip to a back surface of the chip, and further to provide a method capable of solving the above-mentioned problems at a stroke.

**SOLUTION:** In a method for dicing a semiconductor wafer, a semiconductor wafer (1) that a die bond sheet (2) is bonded to a back side thereof is supported and fixed by bonding by using a laser micro-jet dicing tape (24) bonded fixedly to a ring frame (3). In this state, the semiconductor wafer (1), the die bond sheet (2) and an adhesive layer (8) of the laser micro-jet dicing tape (24) are fully cut and diced by a laser micro-jet dicing that a water jet (6) is caused to guide a laser beam (5).



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**DETAILED DESCRIPTION****[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]**This invention is an invention about the dicing method of a semiconductor wafer.

**[0002]**

**[Description of the Prior Art]**In these days [ here ], the needs of a miniaturization of a mounting component grow further and the miniaturization technology of semiconductor packaging is evolving increasingly. In connection with this, a semiconductor chip is also obliged to thin-film-izing and smallness chip making, and the technical needs for carrying out packaging of the semiconductor chip of these thin films and a smallness chip compactly continue to grow [ tend ] simultaneously. Conventionally, these semiconductor chips carry out chip making of the semiconductor wafer which back grinding was carried out and was thin-film-ized in the back grinding process in a dicing process. Next, the semiconductor chip by which chip making was carried out carries out initial-complement spreading of the liquid glue for every die bonding by a pickup die bonder etc. at the leadframe which flows continuously, and die bonding is carried out to the position.

[0003]Among these processes, in a dicing process, as shown to drawing 4 in a front view, the semiconductor wafer 1 is cut by the dicing blade 13, but. Under the present circumstances, since cutting force with the braid 13 starts the wafer 1, a minute chip (it is said chipping and the following only lack.) may occur in chip 1'. 12 in a figure is a dicing tape which has the adhesive layer 12a which sticks the semiconductor wafer 1, and 3 is a ring frame. (The same sign of a figure as used in explanation according to the Drawings of still the following means the same thing.) this -- lack -- generating attracts attention these days as one of the important problems which should be solved. Although it was missing until now and examination for reduction of generating has been performed variously, a thing without the method which may still be satisfied is the actual condition. This chip is in the tendency which will become easy to generate if the thickness of the wafer 1 becomes thin, and the permissible level of a chip also becomes severe with a small chip. Therefore, when

the tendency of thin-film-izing and the smallness chip of a semiconductor chip progresses increasingly as mentioned above, it is guessed easily that the problem of this chip is what will be aggravated from now on.

[0004]It is also called for that packaging of semiconductor chip 1' of the thin film and smallness chip produced by carrying out dicing is compactly carried out with chip occurrence prevention. This comes from the needs of a miniaturization of package size. It is called for that packaging is carried out in the almost same desirable size as the size of a semiconductor chip.

Usually, as shown in drawing 5 as an explanatory view, die bonding of semiconductor chip 1' by which chip making was carried out is carried out to the die pad 15 of the leadframe 16 in which the liquid glue 17 was applied by the pickup die bonder etc. However, when liquid glue is used, control of the required coverage for every die bonding is dramatically difficult, and since it is still more liquefied, it is easy to produce dispersion in a size when applied on the die pad 15. In this case, since the size of semiconductor chip 1' and the size of the liquid glue 17 stop suiting, in consideration of the difference of those both size, it is necessary to carry out packaging with a little larger size than the size of semiconductor chip 1' in the case of packaging. This cannot say a desirable method from the necessity of carrying out packaging in the almost same size as the size of a semiconductor chip, as above-mentioned.

[0005]On the other hand, there is the method of using sheet shaped adhesives (die bond sheet) as adhesives for die bonding (for example, WO97/02595). This fills up organic materials, such as an epoxy resin, silicone resin, an acrylic resin, and polyimide resin, with filler metal or an inorganic filler, and specifically makes them the shape of a pressure sensitive adhesive sheet. The directions for use carry out thermal melting arrival of the pressure sensitive adhesive sheet to a wafer. Subsequently, dicing etc. are processed in the state, and die bonding is carried out after using a chip. At this time, it heats again and complete cure is carried out. As a method of using this die bond sheet, the wafer of a semiconductor chip and the die bond sheet of the size is prepared, it carries beforehand on the leadframe or the method of sticking every sheet on a chip rear face is known widely. However, when sticking the wafer of a die bond sheet on a leadframe or a chip rear face in this case in addition to whose work being dramatically complicated and not being preferred, minute gap may arise, and it cannot be said to be a desirable method for these Reasons. For example, as shown in a front view, the die bond sheet 2 is beforehand pasted together at the rear face of the semiconductor wafer 1 at drawing 6, subsequently to the dicing tape 12 pasting support fixing of this is carried out, and there is a method which carries out full cutting of the semiconductor wafer 1 and the die bond sheet 2 simultaneously with a braid cut dicing apparatus. The size of chip 1' by which dicing was carried out, and wafer 2' of a die bond sheet can make the state where it was stuck in the state where it is thoroughly in agreement and there is no both completely gap from this method. However, since the die bond sheet 2 will intervene not only among the dicing tape 12 but among both under the

semiconductor wafer 1 in this case, Since the wafer 1 or chip 1' becomes easy to produce Bure by this cutting force from the braid 13 too many compared with the case where there is no die bond sheet 2, at the time of dicing, it becomes easy to generate a chip (chipping) notably, and this point poses a problem.

[0006]The method of the description is proposed as chip occurrence prevention by JP,2001-156027,A as a method of solving the demand of compact packaging at once. In the method proposed by JP,2001-156027,A, Along with the scribe line of a semiconductor wafer, after forming the slot of the slitting depth shallower than wafer thickness, where a pattern surface side is protected with masking tape, a wafer back face is ground, and while making wafer thickness thin, it divides into each chip. And the dicing die bond sheet which consists of a substrate and an adhesives layer formed on it is further stuck on a grinding side, It is the method of cutting the adhesives layer which has exposed masking tape between [ after exfoliating ] chips using the dicing blade of width narrower than the flute width formed between chips, and exfoliating a chip and an adhesives layer from a substrate. In this method, by the back grinding in a back grinding process, since a chip is what is divided separately, it can be said that it is a means effective for the occurrence prevention of a chip. However, there is a fault that work makes it complicated dramatically to perform a dicing process in 2 steps etc. compared with the conventional process, The width of the dicing blade used in cutting of an adhesives layer uses the thing of width narrower than the flute width during a chip, When about 30 to 90% of the flute widths between chips of the dicing blade width are desirable, there is, In this case, since the adhesive layer wafer of the dicing die bond sheet formed in the rear face of a chip can become larger than the size of the started chip, If the necessity of carrying out packaging in the almost same size as the size of a semiconductor chip is taken into consideration, the method it may still be satisfied also with this point of a method cannot be said.

[0007]

[Problem(s) to be Solved by the Invention]In the process of carrying out dicing of the semiconductor wafer, this invention prevents generating of a chip, It aims at providing the means for making a chip rear face carry out the attachment unification of the wafer of the die bond sheet of the size of a semiconductor chip, and the size in simple, and aims at providing the method of making it possible to solve the above-mentioned problem at once.

[0008]

[Means for Solving the Problem]As a result of this invention persons' repeating examination wholeheartedly to achieve the above objects, a die bond sheet a semiconductor wafer pasted together at the rear-face side, Where pasting support fixing is carried out to a ring frame on a tape for laser Microjet dicing by which attachment immobilization was carried out, An adhesive layer of a semiconductor wafer, a die bond sheet, and a tape for laser Microjet dicing, A method in which a laser beam carries out full cutting dicing by laser Microjet dicing guided by water jet finds out solving the above-mentioned problem at once, and it came to make this invention based on this knowledge. Namely, a semiconductor

wafer in which (1) die bond sheet was pasted together at the rear-face side as for this invention, Where pasting support fixing is carried out on a tape for laser Microjet dicing, A semiconductor wafer, a die bond sheet, and an adhesive layer of a tape for laser Microjet dicing, A dicing method of a semiconductor wafer, wherein a laser beam carries out full cutting dicing by laser Microjet dicing guided by water jet, (2) Where pasting support fixing is carried out with a die-bonded dicing tape for laser Microjet dicing, a semiconductor wafer, An adhesive layer of a semiconductor wafer and a dicing die bond tape for laser Microjet dicing, A dicing method of a semiconductor wafer, wherein a laser beam carries out full cutting dicing by laser Microjet dicing guided by water jet, And a tape for (3) laser Microjet dicing or a die-bonded dicing tape for laser Microjet dicing, A dicing method of a semiconductor wafer (1) or given in (2) paragraphs fixing a ring frame is provided.

[0009]

[Embodiment of the Invention]Hereafter, this invention is explained according to the suitable embodiment of this invention shown in Drawings. First, as shown in drawing 7, the die bond sheet 2 is pasted together to the back grinding side of the semiconductor wafer 1 which back grinding was carried out in the back grinding process, and was adjusted to predetermined thickness. Although the die bond sheet 2 is pasted together by thermo compression bonding in the state where the pattern surface side 17 of the wafer 1 was turned down at the rear-face side, at this time, When the pattern surface side 17 needs to be protected from the thrust applied in the case of thermo compression bonding, What is necessary is for what is necessary to be just to use the pattern surface side masking tape 7 used at the time of back grinding as it is as masking tape at the time of die bond sheet thermo compression bonding, without exfoliating after the end of grinding, as shown in drawing 8, and just to exfoliate this protective sheet 7 after die bond sheet thermo compression bonding. Subsequently, this semiconductor wafer 1 in which the die bond sheet 2 was pasted together at the rear face by the tape 24 for laser Microjet dicing by which attachment immobilization was carried out at the ring frame 3 as shown in drawing 9, Pasting support fixing is carried out so that the die bond sheet 2 may come to the tape 24 side for laser Microjet dicing. The tape 24 serves as the base film 29 from the adhesive layer 8. In the case of pasting support fixing, if it pastes together using a tape mounter for exclusive use etc., this work can be done simple.

[0010]Next, dicing of the semiconductor wafer 1 fixed as mentioned above is carried out. This method is explained according to drawing 1. As shown in drawing 1, the semiconductor wafer 1 in which rear-face pasting of the die bond sheet 2 was carried out, On the tape 24 for laser Microjet dicing, this whole ring frame 3 by which attachment immobilization was carried out The after-mentioned, installing in the laser Microjet dicing apparatus with which the laser beam 5 (drawing 3) is guided by the water jet 6 -- the adhesive layer 8 of the semiconductor wafer 1, the die bond sheet 2, and the tape 24 for laser Microjet dicing -- full cutting dicing is carried out together. The tape 24 is installed on the fixed angular table of a laser Microjet dicing apparatus. At this time, the base film 29 of

the tape 24 for laser Microjet dicing is cut off partially. In this case, after the semiconductor wafer 1 and the die bond sheet 2 have piled up, in order to carry out dicing of both to a predetermined chip size size simultaneously, Die bond sheet wafer 2' in the state where it was pasted together by the rear face of chip 1' and chip 1' is the completely same size, and the thing in the state where there is also none of a bit gaps and it was stuck will be done. Thereby, the packaging in the almost same size as the size of chip 1' becomes possible enough.

[0011]Although the laser Microjet dicing apparatus 20 said by this invention takes the method which cuts material having by laser beams, such as an YAG laser or a semiconductor laser, Although the laser beam itself is tracking fundamentally, As shown to drawing 3 in an enlarged drawing, even if the direction of the laser beam 5 shifts a little at the time of cutting, the pillar-shaped water jet 6 will be injected simultaneously with the laser beam 5, and a laser beam is guided when the laser beam 5 passes through the inside of this ~~water jet~~ 6. That is, the water jet 6 acts as an optic-axis guide of the laser beam 5. Therefore, there is no dispersion of the laser beam 5 and precise cutting is attained by the width of the path of the water jet 6. There is also a chilling effect of the cleavage site by the water jet 6, and effective dicing which also had the feature with it of being hard to receive heat variation etc. is realized.

[0012]As shown in drawing 1, when carrying out dicing of the semiconductor wafer with a laser Microjet dicing apparatus, the laser beam 5 has a scribe line top derived by the water jet 6, and carries out full cutting chip making of the semiconductor wafer. Since the path of the water jet 6 can be extracted to about 30-40 micrometers, dicing of a semiconductor wafer is possible for it. If it is a dicing method by this method, like dicing by the conventional braid cut method, a dicing blade does not contact the wafer 1 or chip 1' directly, and it does not necessarily cut into it, and since it is dicing by the laser beam 5, there is very little generating of a chip. On the other hand, in the conventional braid cut method as shown in drawing 4, since Bure arises in the wafer 1 or chip 1' with the external pressure from the dicing blade 13 at the time of cutting or cutting force starts, a chip and a crack will occur. On the other hand, in a laser Microjet dicing method, since it is non-contact cutting, the external pressure is not applied at all, but a chip is suppressed to the minimum. The water pressure of the water jet 6 does not act as the external pressure to the extent that a chip is increased in order to pass and escape from tens - hundreds bars, and the small comparatively and cut scribe line.

[0013]In this invention, the semiconductor wafer 1 in which rear-face pasting of the die bond sheet 2 was carried out, This ring frame 3 by which attachment immobilization was carried out is installed in the tape 24 for laser Microjet dicing at a laser Microjet dicing apparatus, Full cutting dicing of the adhesive layer 8 of the semiconductor wafer 1, the die bond sheet 2, and the tape 24 for laser Microjet dicing is carried out. In this case, the water jet 6 of the injected diameter of tens of micrometers, Since it is the structure which can receive in the micropore installed in the fixed angular table 18 of a device, and is drained,

the water jet 6 must be penetrated from a scribe line to the rear-face side of the tape 24 for laser Microjet dicing. Therefore, the tape 24 for laser Microjet dicing needs to make the back penetrate the water jet 6 injected at the time of dicing. However, since full cutting of the adhesive layer 8 of the semiconductor wafer 1, the die bond sheet 2, and the tape 24 for laser Microjet dicing is carried out by the heat of the laser beam 5 by the YAG laser or a semiconductor laser, Although the water jet 6 can be passed as it is by the adhesive layer 8, Since the tape 24 for laser Microjet dicing needs support fixing, it will become impossible to leave the base film 29, without carrying out full cutting, and to penetrate the water jet 6 after all. In view of this point, the tape 24 for laser Microjet dicing applied in this invention, The adhesive layer 8 is taken as a porous film so that full cutting is carried out by the heat of the laser beam 5, and also the base film 29 may be the construction material which makes laser, such as PET, nylon, and PP, penetrate and a water jet can be penetrated. By applying such a tape for laser Microjet dicing, The adhesive layer 8 of the semiconductor wafer 1, the die bond sheet 2, and the tape 24 for laser Microjet dicing can do the space by which full cutting is carried out with the laser 5 and from which a water jet escapes, The base film 29 of the tape 24 for laser Microjet dicing makes laser penetrate, and a water jet escapes from it from a hole. As mentioned above, although the tape 24 for laser Microjet dicing applied in this invention needs to fulfill these claims postulated, if adhesive tape for laser dicing which is proposed by the application for patent 2001-124919 is specifically applied, it will be satisfactory in any way. However, if the tape 24 for laser Microjet dicing applied is not restricted to this and fulfills the above-mentioned conditions, it is usable suitably.

[0014]The adhesive layer 8 of this tape 24 for laser Microjet dicing, Since the die bond sheet 2 must exfoliate from the adhesive layer 8 at a next pickup process, If the usual radiation-curing type adhesive layer used in the tape for laser dicing proposed by the application for patent 2001-124919 is applied, It may be possible to reduce the adhesive power of a binder, and depending on the case, although it is more desirable, the usual acrylic pressure sensitive adhesive may be sufficient. The adhesive tape for laser dicing used for this invention is explained further in full detail below. The adhesive tape used for this invention is adhesive tape which laser uses for laser dicing guided by a water jet. A water Microjet method means the method which controls the path of the water injected as a guide of laser by mum level. Although the pressure of a water jet is 30 - 70MPa preferably and it does not limit to this, if too small, if too large, a chip of an element will occur in the cut surface side at the cutting rear-face side.

[0015]The adhesive tape of this invention uses as a substrate the film which water penetrates. It is a film which specifically penetrates water 30-100 micrometers in diameter, and is a film which penetrates water 50 micrometers in diameter preferably. By using such a substrate, it can flow out of adhesive tape, without the water of a water jet collecting between adhesive tape and a wafer, and adhesive tape produces BATATSUKI with water pressure, and a possibility of generating chipping (lack) as a result can be canceled.

[0016]As for the structure of a substrate, in order for this substrate to penetrate water, it is preferred that they are mesh shape or porosity. As a substrate, a fiber and rubber-like elasticity objects, such as a nylon mesh currently used for a nonwoven fabric, a hollow filament, textiles, and the electromagnetic wave shields of PDP, are mentioned, and especially a nonwoven fabric is preferred. It is desirable to show ductility without directivity also in the case of a nonwoven fabric. The rubber-like elasticity object may have honeycomb structure.

[0017]When using a fiber as a substrate, not less than 10 micrometers less than 50 micrometers of a fiber diameter are preferred. It is not desirable, in order that a flat part may fuse and a fiber diameter may weld to a chucking table in a not less than 50-micrometer substrate. If the path of the portion into which textiles lay one upon another is also not less than 50 micrometers, since the portion is fused, it is not preferred. Thus, 20-200 micrometers of opening diameters which make water permeability the substrate formed are 40-200 micrometers more preferably.

[0018]The heat resistance of the substrate used is suitably chosen by the conditions of laser dicing, such as cutting speed, an output of laser, and amount of water. It is required to use what is not fused with the heat at the time of laser dicing.

[0019]The construction material of a substrate Polyethylene, polypropylene, ethylene propylene rubber, The polybutene 1, an ethylene-vinylacetate copolymer, an ethylene-ethyl acrylate copolymer, The homopolymer of alpha olefins, such as an ionomer, or a copolymer, polyethylene terephthalate, Engineering plastics, such as polycarbonate and polymethylmethacrylate, Thermoplastic elastomer, such as polyamide, such as nylon 6, nylon 6, 6, Nylon 12, and aramid, or polyurethane, a styrene ethylene-butene, or a pentene system copolymer, is mentioned. Two or more sorts chosen from these groups could be mixed, and it can choose arbitrarily with an adhesive property with an adhesive layer. Polypropylene, polyethylene terephthalate, nylon 6, and 6 are [ among these ] especially preferred.

[0020]In order to prevent vibration of material, the thinner one of the thickness of a substrate is preferred, and since even a substrate is not cut, if even extensibility is maintainable, the thinner one of a substrate is preferred. Therefore, 30-300 micrometers is suitable for the thickness of a substrate, and its 100 micrometers are preferred.

[0021]One side of adhesive tape consists of an adhesive layer produced by applying and drying the solution of acrylic pressure sensitive adhesive as well as [ conventionally ] elegance. As for this adhesive layer, it is preferred to consist of a radiation-curing type adhesive layer. The radiation as used in the field of this invention means an ionizing radiation like a beam of light like ultraviolet rays, or an electron beam.

[0022]The die bond sheet as used in the field of this invention which the die bond sheet 2 can apply a general-purpose die bond sheet, for example, consists of an epoxy resin, polyamide resin, polyimide resin, silicone resin, an acrylic resin and its strange living thing, or these mixtures is known widely. As shown in drawing 2, in this invention, attachment

immobilization of the dicing die bond tape 7 for laser Microjet dicing which has a function of both the die bond sheet 2 and the tape 24 for laser Microjet dicing for support fixing is carried out at the ring frame 3, Where pasting support fixing is carried out, dicing of the semiconductor wafer 1 may be carried out by a laser Microjet dicing method. In this case, full cutting only of the adhesive layer 10 will be carried out, and the dicing die bond tape 7 for laser Microjet dicing will exfoliate from the base film 29 in a next pickup process. This adhesive layer 10 may be the presentation which mixed usual acrylic pressure sensitive adhesive and radiation-curing type binder in the construction material of the above-mentioned die bond sheet, and it is [ adhesive layer ] usable suitably also in the thing of the multilayer structure of the layer of a die bond sheet presentation, and acrylic pressure sensitive adhesive or a radiation-curing type adhesive layer. A presentation as which the acrylic pressure sensitive adhesive and the radiation-curing type binder which are said here can also use the usual thing, for example, are proposed in the above-mentioned application for patent 2001-124919 is applied widely. The base film should just carry out the base film 29 which is the construction material which the laser beam 5 penetrates, and penetrates the water jet 6 like the above-mentioned as it is.

[0023]As mentioned above, the semiconductor wafer 1 in which the die bond sheet 2 was pasted together at the rear-face side, The state which carried out pasting support fixing to the ring frame 3 on the tape 24 for laser Microjet dicing by which attachment immobilization was carried out, Or where pasting support fixing is carried out to the ring frame 3 with the dicing die bond tape 7 for laser Microjet dicing by which attachment immobilization was carried out, the semiconductor wafer 1 with a laser Microjet dicing method. By carrying out full cutting of the adhesive material layer 8 of the semiconductor wafer 1, the die bond sheet 2, and the tape 24 for laser Microjet dicing, or the adhesive layer 10 of the semiconductor wafer 1 and the dicing die bond tape 7 for laser Microjet dicing, Generating of a chip is suppressed even to a limit, and chip 1', die bond sheet wafer 2' pasted together by the rear face, or dicing die bond tape adhesive layer wafer 10' is the completely same size, and it becomes possible to make the thing in the state where there is also none of a bit gaps and it was stuck.

[0024]

[Example]Hereafter, based on working example, this invention is explained in detail. this invention is not limited to the following working example, and can be changed to versatility. The following evaluation was performed about working example 1-4 and the comparative examples 1-4.

- a chip and adhesives (a die bond sheet wafer or a dicing die bond tape adhesive layer wafer.) Or the size gap with the chip after size gap dicing with liquid glue and adhesives (a die bond sheet wafer, a dicing die bond tape adhesive layer wafer, or liquid glue) was observed, and the maximum of gap was measured.

- The chip after chip evaluation dicing was observed, the missing (a crack is included) size generated in the chip surface was measured, and it was considered as average value.The

size of the chip was made into the size from a tip end part.

- The workability of workability 1 wafer processing was seen. The details of the tape used in working example 1-4 and the comparative examples 1-4 and devices were collectively indicated to Table 1. The result of having carried out the above-mentioned evaluation criteria was indicated to Table 2.

[0025]

[Table 1]

表1

	基材フィルムA：PET製 不織布 樹脂厚3.0μm 開口孔5.0μm 厚さ100μm
レーザーマイクロジェットダイシング用テープA	粘着剤A：アクリル系共重合体 硬化剤 エクアリート系切刃アーバー 光重合開始剤 厚さ 10 μm
レーザーマイクロジェットダイシング用テープB	基材フィルムB：PET製 織物 樹脂厚3.5μm 開口孔6.0μm 厚さ 90μm
	粘着剤A：アクリル系共重合体 硬化剤 エクアリート系切刃アーバー <sup>*</sup> 光重合開始剤 厚さ 10 μm
ダイシングテープ	基材フィルムC：塗装材フィルム 厚さ100μm
	粘着剤A：アクリル系共重合体 硬化剤 エクアリート系切刃アーバー <sup>*</sup> 光重合開始剤 厚さ 10 μm
ダイボンドシート	自立化成社製 OF-400
レーザーマイクロジェットダイシング用ダイシング・ダイボンドテープ	基材フィルムB：PET製不織布 樹脂厚3.0μm 開口孔5.0μm 厚さ100μm
	接着剤：粘着剤A組成 エポキシ樹脂 厚さ 10 μm
ダイシング・ダイボンドテープB	リンテック社製 Adw111 LE5000
保護テープ	古河電工工業社製 SP-575B-150
レーザーマイクロジェットダイシング装置	SYNOVA社製 レーザーマイクロジェット LDS200CYAGレーザー
ブレードカットダイシング装置	ディスクオーブン DAD-340
裏面研磨装置	ディスクオーブン DFG-B40

[0026]The die bond sheet was pasted together to a 6-inch silicon wafer with a working example 1 thickness of 150 micrometers, and pasting support fixing was carried out to a 6-inch ring frame with the dicing tape A which carried out attachment immobilization. This was installed in the laser Microjet dicing apparatus, and dicing was carried out to the chip size of 2 mm x 2 mm cut speed 100mm/s on conditions with a laser beam diameter (diameter of a water jet) of 40 micrometers. Even the adhesive layer of the tape for dicing was cut in working example 1-4.

[0027]The die bond sheet was pasted together to a 6-inch silicon wafer with a working example 2 thickness of 150 micrometers, and pasting support fixing was carried out to a 6-inch ring frame with the dicing tape A which carried out attachment immobilization. This

was installed in the laser Microjet dicing apparatus, and dicing was carried out to the chip size of 5 mm x 5 mm cut speed 100mm/s on conditions with a laser beam diameter (diameter of a water jet) of 40 micrometers.

[0028]The die bond sheet was pasted together to a 6-inch silicon wafer with a working example 3 thickness of 150 micrometers, and pasting support fixing was carried out to a 6-inch ring frame with the dicing tape B which carried out attachment immobilization. This was installed in the laser Microjet dicing apparatus, and dicing was carried out to the chip size of 2 mm x 2 mm cut speed 100mm/s on conditions with a laser beam diameter (diameter of a water jet) of 40 micrometers.

[0029]With the dicing die bond tape A which carried out attachment immobilization, pasting support fixing of the 6-inch silicon wafer with a working example 4 thickness of 150 micrometers was carried out to a 6-inch ring frame, and UV irradiation was carried out to it. This was installed in the laser Microjet dicing apparatus, and dicing was carried out to the chip size of 2 mm x 2 mm cut speed 100mm/s on conditions with a laser beam diameter (diameter of a water jet) of 40 micrometers.

[0030]Pasting support fixing of the 6-inch silicon wafer with a comparative example 1 thickness of 150 micrometers was carried out to a 6-inch ring frame with the dicing tape C which carried out attachment immobilization. This was installed in the braid cut dicing apparatus, and dicing was carried out to the chip size of 2 mm x 2 mm on the conditions of cut speed 100 mm/s and 40 micrometers of braid thickness. Initial-complement spreading of the liquid glue was carried out on the leadframe which takes up a chip by a pickup die bonder and flows continuously, and die bonding of the chip which took up in the position was carried out.

[0031]The die bond sheet was pasted together to a 6-inch silicon wafer with a comparative example 2 thickness of 150 micrometers, and pasting support fixing was carried out to a 6-inch ring frame with the dicing tape C which carried out attachment immobilization. This was installed in the braid cut dicing apparatus, and dicing was carried out to the chip size of 2 mm x 2 mm on the conditions of cut speed 100 mm/s and 40 micrometers of braid thickness.

[0032]Pasting support fixing of the 6-inch silicon wafer with a comparative example 3 thickness of 700 micrometers was carried out with the dicing tape C. This was installed in the braid cut dicing apparatus, and the slot of the 70-micrometer depth was formed so that it might become a chip size of 5 mm x 5 mm on the conditions of cut speed 100 mm/s and 40 micrometers of braid thickness. Subsequently, masking tape was pasted together to the field in which the slot was formed, and it ground until it was divided into the chip size of 5 mm x 5 mm by grinding attachment. In the grinding side, UV irradiation of the dicing die bond tape B was carried out after pasting and to masking tape, and it exfoliated. The dicing die bond tape was irradiated with ultraviolet rays, it installed in the braid cut dicing apparatus, and full cutting of the adhesive layer of a dicing die bond tape was carried out on the conditions of cut speed 100 mm/s and 35 micrometers of braid thickness braid

### thickness

[0033] Pasting support fixing of the 6-inch silicon wafer with a comparative example 4 thickness of 700 micrometers was carried out with the dicing tape C. This was installed in the braid cut dicing apparatus, and the slot of the 70-micrometer depth was formed so that it might become a chip size of 2 mm x 2 mm on the conditions of cut speed 100 mm/s and 40 micrometers of braid thickness. Subsequently, masking tape was pasted together to the field in which the slot was formed, and it ground until it was divided into the chip size of 2 mm x 2 mm by grinding attachment. In the grinding side, UV irradiation of the dicing die bond tape B was carried out after pasting and to masking tape, and it exfoliated. The dicing die bond tape was irradiated with ultraviolet rays, it installed in the braid cut dicing apparatus, and full cutting of the adhesive layer of a dicing die bond tape was carried out on the conditions of cut speed 100 mm/s and 20 micrometers of braid thickness braid thickness.

[0034]

[Table 2]

• 2

[0035]The above-mentioned test result shows the following thing.

Working example 1-4: It was checked that there is no gap with a chip, a die bond sheet wafer, or a dicing die bond tape adhesive layer wafer, and a problem does not have workability at the minimum as compared with the former as for a chip, either.

**Comparative example 1:** Gap with a chip and liquid glue is large, and a chip is also large.

Comparative example 2: Workability is dramatically bad, although gap with a large

**comparative example 3:chip and die bond sheet wafer does not have a chip very much, either and a chip is also the minimum.**

**Comparative example 4:** Those with some and workability also have the dramatically bad gap with a chip and a die bond sheet wafer.

[0036]

[Effect of the Invention]In the process of carrying out dicing of the semiconductor wafer, this invention the semiconductor wafer in which the die bond sheet was pasted together at the rear-face side, Where pasting support fixing is carried out to a ring frame on the tape for laser Microjet dicing by which attachment immobilization was carried out, The adhesive layer of a semiconductor wafer, a die bond sheet, and the tape for laser Microjet dicing by

the method of carrying out full cutting dicing by laser Microjet dicing. It realized preventing chip generating at the time of dicing, and making a chip rear face carry out the attachment unification of the die bond sheet wafer of the size of a semiconductor chip, and the size is simple.

[Translation done.]

**\* NOTICES \***

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
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**DESCRIPTION OF DRAWINGS****[Brief Description of the Drawings]**

[Drawing 1]The front view showing one example of typical working example of this invention.

[Drawing 2]The front view showing the other examples of typical working example of this invention.

[Drawing 3]The enlarged drawing showing the laser-beam passage in a water jet.

[Drawing 4]The figure showing the conventional braid cut dicing method.

[Drawing 5]The figure showing the state where die bonding of the chip was carried out on the die pad of a leadframe by liquid glue.

[Drawing 6]The figure showing braid cut dicing of the semiconductor wafer in which sheet shaped adhesive was pasted together by the rear face.

[Drawing 7]The figure showing die bond sheet pasting to a semiconductor wafer rear face.

[Drawing 8]The figure showing die bond sheet pasting in the state where the pattern surface side of the semiconductor wafer was protected with masking tape.

[Drawing 9]The front view showing the state where pasting support fixing of the semiconductor wafer in which the die bond sheet was pasted together by the rear face was carried out on the tape for laser Microjet dicing.

**[Description of Notations]**

1 Semiconductor wafer

1' Chip

2 Die bond sheet

2' Die bond sheet wafer

3 Ring frame

4 The tape for dicing

24 The tape for laser Microjet dicing

5 Laser beam

6 Water jet

7 The dicing die bond tape for laser Microjet dicing

- 8 The adhesive layer of the tape for laser Microjet dicing
- 9 Base film
- 29 The base film of the tape for laser Microjet dicing
- 10 The adhesive layer of the dicing die bond tape for laser Microjet dicing
- 10' Adhesive layer wafer of the dicing die bond tape for laser Microjet dicing
- 12 Dicing tape
- 13 Dicing blade
- 14 Inner lead
- 15 Die pad
- 16 Leadframe
- 17 Liquid glue
- 18 The fixed angular table of a laser Microjet dicing apparatus

[Translation done.]

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**CLAIMS****[Claim(s)]**

[Claim 1]Where pasting support fixing is carried out on a tape for laser Microjet dicing, a die bond sheet a semiconductor wafer pasted together at the rear-face side, A semiconductor wafer, a die bond sheet, and an adhesive layer of a tape for laser Microjet dicing, A dicing method of a semiconductor wafer, wherein a laser beam carries out full cutting dicing by laser Microjet dicing guided by water jet.

[Claim 2]Where pasting support fixing is carried out with a die-bonded dicing tape for laser Microjet dicing, a semiconductor wafer, An adhesive layer of a semiconductor wafer and a dicing die bond tape for laser Microjet dicing, A dicing method of a semiconductor wafer, wherein a laser beam carries out full cutting dicing by laser Microjet dicing guided by water jet.

エハをレーザーマイクロジェットダイシング用テープにて貼合支持固定した状態を示す正面図。

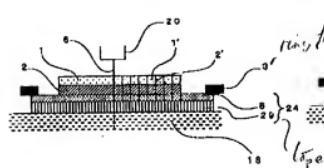
【符号の説明】

- 1 半導体ウェハ
- 1' チップ
- 2 ダイボンドシート
- 2' ダイボンドシート小片
- 3 リングフレーム
- 4 ダイシング用テープ
- 24 レーザーマイクロジェットダイシング用テープ
- 5 レーザービーム
- 6 ウォータージェット
- 7 レーザーマイクロジェットダイシング用ダイシング・ダイボンドテープ
- 8 レーザーマイクロジェットダイシング用テープの粘着剤層

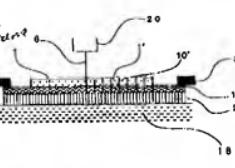
9 基材フィルム

- 29 レーザーマイクロジェットダイシング用テープの基材フィルム
- 10 レーザーマイクロジェットダイシング用ダイシング・ダイボンドテープの粘着剤層
- 10' レーザーマイクロジェットダイシング用ダイシング・ダイボンドテープの粘着剤層小片
- 12 ダイシングテープ
- 13 ダイシングプレード
- 14 インナリード
- 15 ダイバッド
- 16 リードフレーム
- 17 液状接着剤
- 18 レーザーマイクロジェットダイシング装置の固定テーブル

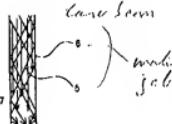
【図1】



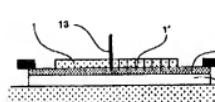
【図2】



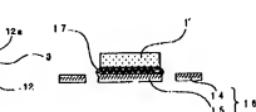
【図3】



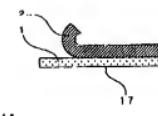
【図4】



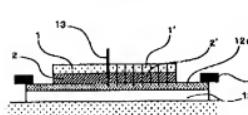
【図5】



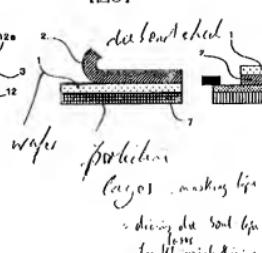
【図7】



【図6】



【図8】



【図9】

